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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/898,254	07/03/2001	Jennifer Quirin Trelewicz	IBMN.026US01 (0526)	1933
7590	05/30/2006		EXAMINER	
Chambliss, Bahner & Stophel, P.C. 1000 Tallan Building Two Union Square Chattanooga, TN 37402			THOMPSON, JAMES A	
			ART UNIT	PAPER NUMBER
			2625	

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	09/898,254	TRELEWICZ ET AL.	
	Examiner James A. Thompson	Art Unit 2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 06 March 2006.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1,2,5,7,8,11,13,14,17,18,21 and 23 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1,2,5,7,8,11,13,14,17,18,21 and 23 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 12 December 2001 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

1. Applicant's arguments filed 06 March 2006 have been fully considered but they are not persuasive.

While Applicant's amendments have overcome all prior rejections and objections listed in all previous office actions, further consideration of the claims has brought forth new issues with regard to 35 USC §101 and 35 USC §112, 2<sup>nd</sup> paragraph, which are set forth in detail below. Additionally, a further search of the prior art has uncovered references which render the present claims obvious to one of ordinary skill in the art at the time of the invention. The corresponding rejections under 35 USC §103(a) are set forth in detail below.

***Claim Rejections - 35 USC § 101***

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1, 2 and 5 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1, 2 and 5 recite a mathematical algorithm that is performed upon data. Specifically, a mathematical function ("spot function") is defined and manipulated. There is no concrete, tangible and useful result from the mathematical operations. Thus, claims 1, 2 and 5 are directed to a pure algorithm. Claims 1, 2 and 5 are not directed to a useful process, machine, article of manufacture, or composition of matter, and are therefore non-statutory and not eligible for patent protection under 35 USC §101.

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4. Claims 17, 18 and 21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

While claims 17, 18 and 21 are directed to an article of manufacture comprising a program storage medium readable by a computer, the medium tangibly embodying one or more programs of instruction executable by the computer to perform a method, the instructions themselves which are executed by the computer to perform the recited method do not define any structural or functional interrelationships between the computer program and other elements of the computer which permit the computer's functionality to be realized. The instructions stored on the program storage medium and executed by the computer simply perform operations internally upon non-functional descriptive data, in this case a spot function. The claimed method, which is performed by the execution of the stored instructions, does not provide any concrete, tangible and useful result, and is merely the manipulation of non-functional descriptive data. Therefore, claims 17, 18 and 21 are non-statutory and not eligible for patent protection under 35 USC §101.

*Claim Rejections - 35 USC § 112*

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 17, 18 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In the preamble of claims 17, 18 and 21, Applicant clearly intends to claim an article of manufacture, specifically an article of manufacture tangibly embodied as a storage medium readable by a computer, which has programs of instruction executable by said computer stored thereon. However, the claim then recites "the method comprising:" and goes on to recite method step limitations. Are claims 17, 18 and 21 meant to be method claims or article of manufacture claims? Claims 17, 18 and 21 presently do not recite one particular type of statutory invention, and thus do not particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-2, 7-8, 17-18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curry (US Patent 5,537,223) in view of Allen (US Patent 6,535,307 B1).

Regarding claims 1, 7, 17 and 23: Curry discloses a control unit (figure 2(51) of Curry) for receiving a print file and processing the print file for printing (column 9, lines 25-31 and column 10, lines 61-65 of Curry); a print head (figure 2(76, 15) of Curry) for conveying a print job according to the

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print file (column 5, lines 58-67 of Curry); and a device (figure 2 (70) of Curry) for generating a spot for use in halftoning wherein the halftoning reproduces an image defined by the print file using the print head (column 11, lines 13-23 of Curry), the device defines a spot function that combines two functions (the functions that comprise the function for an ellipse) selected to provide a predetermined spot shape for use in a halftone cell (column 11, lines 54-58 of Curry) and rotates the spot function using a parameterized spot rotation function (figures 38-41 and column 31, lines 5-15 of Curry) that varies according to a value of a first and second spot function ordinate (figures 38-41 and column 31, lines 13-20 of Curry) and scaled according to a shape changing scaling function (column 27, lines 43-54 of Curry), wherein the spot function used by the device is described by  $f(x,y) = \frac{1}{2}(\cos(\pi x/p_x) + \alpha \cos(\pi y/p_y))$ , where  $x$  and  $y$  are the first and second spot function ordinates,  $p_x$  scales ordinate  $x$ ,  $p_y$  scales ordinate  $y$  (column 31, lines 13-20 of Curry), and  $\alpha$  is a scaling value that determines the ellipticity of the spot function (column 27, lines 43-54 of Curry). The spot shape is an ellipse, and can thus be represented by the basic function  $f(x,y) = \frac{1}{2}(\cos(\pi x/p_x) + \alpha \cos(\pi y/p_y))$ , where  $\alpha$  determines the relative scale of the major and minor axes of the ellipse and the values  $\pi/p_x$  and  $\pi/p_y$  determine the rotational properties of the ellipse with respect to the  $x$  and  $y$  coordinates, respectively. Changing the rotation of the ellipse (figures 38-41 and column 31, lines 5-20 of Curry) alters the values of  $p_x$  and  $p_y$  for this representation of the spot function. The value

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of  $\alpha$  is determined based on the resultant shape of the ellipse, which is affected by the Gaussian spot growth that occurs as a result of the laser optics and the spot growth function for the gray level that is to be rendered (column 27, lines 43-54 of Curry).

Curry does not disclose expressly that the spot function is scaled using a parameterized spot scaling function that varies according to a value of a first and a second spot function ordinate; and that the spot function used by the device is

described by  $f(x,y) = \frac{1}{2} \left( \cos(\pi x/p_x) + \frac{1}{S(p,r)} \cos(\pi y/p_y) \right)$  where  $p$  is a spot shape parameter for controlling the shape of the spot,  $S(p,r)$  is a scaling function, and  $r$  is the radius of the spot.

Allen discloses scaling the spot function according to a parameterized spot scaling function that varies according to a value of a first and a second spot function ordinate (setting spot size, shape and ellipticity) (column 4, lines 16-23 of Allen); and that the spot function used by the device is

described by  $f(x,y) = \frac{1}{2} \left( \cos(\pi x/p_x) + \frac{1}{S(p,r)} \cos(\pi y/p_y) \right)$ , where  $p$  is a spot shape parameter for controlling the shape of the spot,  $S(p,r)$  is a scaling function, and  $r$  is the radius of the spot (spot size and edge sharpness) (column 4, lines 16-23 of Allen). By specifically controlling the spot size, shape and ellipticity, the factor  $\alpha$  of the equation which represents the spot function of an elliptical halftone spot would be a function of ordinate position and spot radius, since the radius is directly related to the spot size and the ellipticity is controlled based on the ordinate values. By controlling the spot size and edge sharp-

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ness of the spot function, the amount of spreading of the spot function is controlled. Since the spot is an ellipse, this would also be based on the radius and ordinates of the spot function. Thus, in the given elliptical equation, the factor  $a$  can be replaced with a value that is a function of the ordinates (which can also be represented simply by  $p$ ) and the radius ( $S(p,r)$ ). Thus, the resultant spot function can be expressed as

$$f(x,y) = \frac{1}{2} \left( \cos(\pi x/p_x) + \frac{1}{S(p,r)} \cos(\pi y/p_y) \right)$$

where  $x$  and  $y$  are the first and second spot function ordinates,  $p_x$  scales ordinate  $x$ ,  $p_y$  scales ordinate  $y$ ,  $p$  is a spot shape parameter for controlling the shape of the spot,  $S(p,r)$  is a scaling function, and  $r$  is the radius of the spot.

Curry and Allen are combinable because they are from the same field of endeavor, namely digital halftone rendering and the manipulation of halftone spot functions. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to further control the scale and spreading of the elliptical spot function taught by Curry, according to the teachings of Allen. The motivation for doing so would have been that finer control over the spot function naturally results in better quality printed output. Therefore, it would have been obvious to combine Allen with Curry to obtain the invention as specified in claims 1, 7, 17 and 23.

Further regarding claim 1: The printing system of claim 7 performs the method of claim 1.

Further regarding claim 23: The means for receiving recited in claim 23 corresponds to the control unit of claim 7. The means for conveying recited in claim 23 corresponds to the

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print head of claim 7. The means for generating recited in claim 23 corresponds to the device of claim 7.

Further regarding claim 17: Curry discloses an article of manufacture comprising a program storage medium readable by a computer, the medium tangibly embodying one or more programs of instructions executable by the computer to perform a method for halftoning an image (column 8, lines 49-60 and column 9, lines 29-34 of Curry). Said article of manufacture performs the method of claim 1.

**Regarding claims 2, 8 and 18:** The spot function set forth in claims 1, 7, 17 and 23 is defined by two functions ( $\cos(\pi x/p_x)$ ) and  $\frac{1}{S(p,r)} \cos(\pi y/p_y)$ . The overall function of the elliptical spot

is fully expressed as  $f(x,y) = \frac{1}{2} \left( \cos(\pi x/p_x) + \frac{1}{S(p,r)} \cos(\pi y/p_y) \right)$ , as set forth above, where x and y are the first and second spot function ordinates,  $p_x$  scales ordinate x,  $p_y$  scales ordinate y, p is a spot shape parameter for controlling the shape of the spot,  $S(p,r)$  is a scaling function, and r is the radius of the spot. Non-separable changes in spot shape is an inherent property of the two functions since the two functions form the

elliptical spot function so that  $f(x,y) = \frac{1}{2} \left( \cos(\pi x/p_x) + \frac{1}{S(p,r)} \cos(\pi y/p_y) \right)$ .

9. Claims 5, 11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Curry (US Patent 5,537,223) in view of Allen (US Patent 6,535,307 B1) as applied to claims 1, 7 and 17 above, and further in view of obvious engineering design choice.

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**Regarding claims 5, 11 and 21:** Curry discloses a Gaussian spot growth that occurs as a result of the laser optics and the spot growth function for the gray level that is to be rendered (column 27, lines 43-54 of Curry). As is well-known in the art,

a Gaussian distribution takes the form of  $P(x) = \frac{1}{\sigma_1 \sqrt{2\pi}} \exp\left(-\frac{(x-\mu)^2}{2\sigma_2^2}\right)$ .

Allen discloses scaling the spot function (spot size and edge sharpness) using the scaling function  $S(p,r)$ , where p is a spot shape parameter for controlling the shape of the spot and r is the radius of the spot (column 4, lines 16-23 of Allen).

Curry in view of Allen does not disclose expressly that

$$S(p,r) = 1 + \frac{1}{p_m \sqrt{2\pi}} \exp\left(\frac{-(r/\sqrt{2} - 1/2)^2}{2p^2}\right), \text{ where } p_m \text{ sets a maximum ellipticity of the spot.}$$

However, it would have been an obvious engineering design choice to set the parameters of the Gaussian distribution taught by Curry such that the spot function is

$$\text{specifically } S(p,r) = 1 + \frac{1}{p_m \sqrt{2\pi}} \exp\left(\frac{-(r/\sqrt{2} - 1/2)^2}{2p^2}\right). \text{ In this equation,}$$

$p_m$  sets a maximum ellipticity of the spot, which is an inherent property of  $p_m$ . The motivation one of ordinary skill in the art at the time of the invention would have had to set the spot function in such a manner would be that (1) the offset of +1 would set a specific rotation to the ellipse, such as that shown in figures 38-41 of Curry, and (2) a Gaussian distribution such

as denoted by the  $\frac{1}{p_m \sqrt{2\pi}} \exp\left(\frac{-(r/\sqrt{2} - 1/2)^2}{2p^2}\right)$  part of the equation is

one of the many options for a spot function that can be employed based on the requirements of the printing and the particular

characteristics of the laser diodes used in print head. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify in the above way the invention as specifically set forth by Curry in view of Allen, thus obtaining the invention as specified in claims 5, 11 and 21.

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Curry (US Patent 5,537,223) in view of Allen (US Patent 6,535,307 B1) and Vaswani (US Patent 5,835,097).

Regarding claim 13: Curry in view of Allen does not disclose expressly that the device is a hardware card disposed between the control unit and the print head.

Vaswani discloses a hardware card for graphics processing (figure 3A(310) of Vaswani) disposed between a control unit (figure 3A(301-304) of Vaswani) and an image output device (figure 3A(305) of Vaswani) (column 6, lines 53-60 of Vaswani).

Curry in view of Allen is combinable with Vaswani because they are from similar problem solving areas, namely the construction of an electronic device that performs digital image data processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody said device taught by Curry in view of Allen as a hardware card disposed between a control unit and an image output device, as taught by Vaswani, said control unit being the control unit taught by Curry in view of Allen and said image output device being the print head taught by Curry in view of Allen. The motivation for doing so would have been that, as is well-known in the art, a separate hardware card for graphical processing decreases the computational burden on the main computer

processor. Therefore, it would have been obvious to combine Vaswani with Curry in view of Allen to obtain the invention as specified in claim 13.

**11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Curry (US Patent 5,537,223) in view of Allen (US Patent 6,535,307 B1) and Cunniff (US Patent 5,842,015).**

**Regarding claim 14:** Curry in view of Allen does not disclose expressly that the device is a hardware card disposed within the control unit.

Cunniff discloses a graphics hardware card (figure 1(16) of Cunniff) disposed within a control unit (figure 1(18) of Cunniff) (column 5, lines 52-57 of Cunniff).

Curry in view of Allen is combinable with Cunniff because they are from similar problem solving areas, namely the construction of an electronic device that performs digital image data processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody said device taught by Curry in view of Allen as a hardware card disposed within the control unit. The motivation for doing so would have been that a separate hardware card for graphical processing decreases the computational burden on the main computer processor (column 1, lines 21-26 of Cunniff). Therefore, it would have been obvious to combine Cunniff with Curry in view of Allen to obtain the invention as specified in claim 14.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James A. Thompson  
Examiner  
Technology Division 2625

  
22 May 2006



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